

ABSTRACT

A microfluidic structure having an electrostatic sealing device is disclosed. The electrostatic sealing device includes a first electrode and a second electrode opposite the first electrode. At least one of the electrodes has an elastic layer facing the other 5 electrode. The second electrode is capable of moving toward the first electrode and forming a seal with the first electrode in response to a voltage difference between the two electrodes. The electrostatic sealing device eliminates the need for mechanical components that are traditionally used for generating a mechanical force between two components of a microfluidic structure and thus reduces complexity of the microfluidic 10 structure and possible interference with optical interrogation of the microfluidic structure. Moreover, the seal can be established or removed simply by turning the voltage on or off. The electrostatic sealing device can also be used as a valve, a pump, or a combination thereof, to control fluid flow in the microchannels of a microfluidic structure.